

COMPUTER WORKSHOP

Colour-calibrate your monitor

A monitor fresh from its box probably isn't producing accurate colours. Chris Finnamore explains how to calibrate it properly

Whether you've got an expensive LCD or an old CRT, the chances are that your monitor hasn't been correctly configured to produce accurate colours. Adjusting the colour, contrast and colour temperature can all massively improve your viewing experience and ensure that what you see onscreen is accurate. Using a few free tools, we'll show you how to adjust your monitor's settings to get the best image. However, you'll need to refer to your monitor's manual for instructions on adjusting its settings, as every monitor differs slightly.

Windows Vista has colour calibration built in, but you'll need to bring Windows XP up to date for the best results by downloading the Color Control Applet from <http://tinyurl.com/ajg7t>. Finally, if you've got more than one monitor connected to your PC, you'll need to run the tests outlined here on each one. First, identify which monitor is which. Windows XP users should right-click the desktop and select Properties. Click Desktop and then click Identify. This will display a large 1 and 2 on your monitors. Note which one is which. Vista users have to right-click the desktop and select Personalize and then select Display Settings. Click Identify Monitors and note down which monitor is 1 and which one is 2.

INTRODUCTION

Modern LCD monitors have powerful automatic setup features, so you could be forgiven for assuming they'll work straight out of the box and won't need adjusting. While a fresh monitor should be fine for normal Windows tasks such as surfing the web, it probably won't reproduce colour – in your digital photos, for example – faithfully.

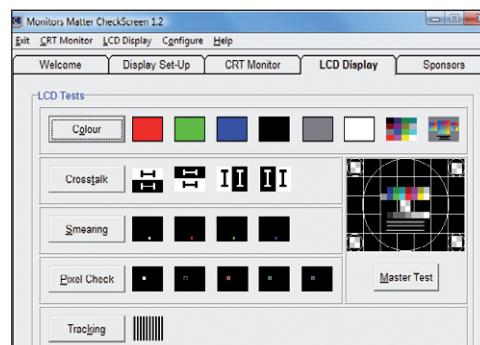
If you want your monitor to stay true to the source material and display colour accurately, you'll need to calibrate it. Professional calibration tools are expensive, but as long as you don't intend to set up a print shop you can get acceptable results from certain free software packages.

In this month's *Computer Workshop* we'll show you how to get the best out of your screen, and all it'll cost you is a little time and effort.

Chris Finnamore
Labs Manager



chris@computershopper.co.uk



▲ Monitors Matter CheckScreen performs a series of tests

your monitor. For the best results, perform the steps below in a dimly lit room with no light sources reflecting in your monitor.

BASIC CALIBRATION

To set the brightness and contrast of your monitor correctly there are two tests you can perform, both of which can be done with a photo-editing package. We've used GIMP as it's free. We are going to use the Black Point test to set your monitor's brightness, and the White Point test to set contrast.

BLACK POINT TEST

Go to www.gimp.org and download the installer program. (You'll also find GIMP in the Expert Toolkit section of the cover DVD.) Install and run GIMP. Before you start playing with your monitor's settings, you need to get the test ready. First, create a new document with the same dimensions as your monitor's native resolution (make sure your desktop is set to this resolution, too), so select New from the File menu. Make sure the Pixels option is selected in the drop-down box, and enter your monitor's horizontal and vertical resolution in the Width and Height boxes, such as 1,280 for width and 1,024 for height. Click OK to create the image, and adjust the image's window so it fills most of the screen but leaves the toolbar visible. Click on the magnifying glass icon and click on the blank image to zoom in to 100 per cent.

You now need to make the image black. Halfway down the toolbar are the foreground and background colours. The foreground should be black by default, but if it's not click on the foreground colour and select black

INITIAL CHECKS

The first step is to check how images look on your screen. You can do this by looking at some of your photos, but a more scientific way is to use a monitor test program. Download the free Monitors Matter CheckScreen program from www.benchmarkhq.ru/fclick/fclick.php?fid=138. Save the Zip file to your hard disk and run CSInst32.exe. Follow the steps to install the program and then run it. The program has several tabs for different types of test and utilities to test different aspects of your monitor, but we're only interested in the colour tests. Click on the CRT Monitor or LCD Display tab depending on your monitor type. Click on the Colour button to launch the colour test.

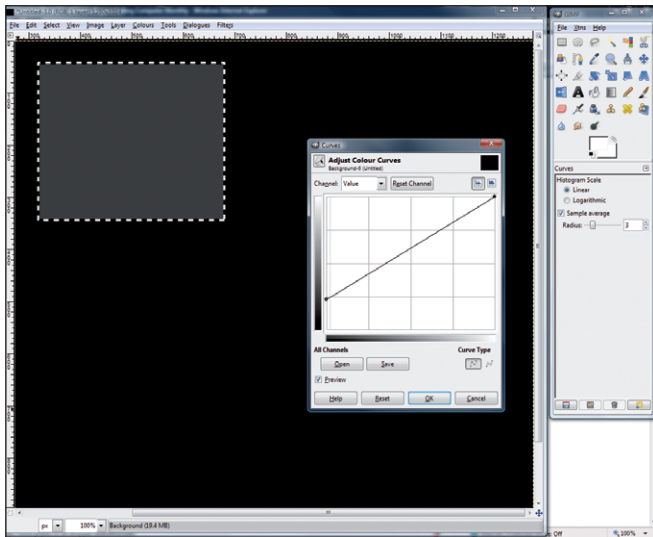
The colour test cycles through the standard Windows colours when you click the mouse. Look at each colour and check that it looks correct. Your monitor may display reds as slightly orange, or darker colours may appear bleached out. Pay particular attention to the black and white tests. If your monitor is not set up correctly, blacks and whites will both appear grey. If you notice any problems, you need to calibrate

Pay and display Advanced calibration

While the steps described above will certainly improve how images look on your screen, it's a very subjective way of calibrating your screen, because it is dependent on the human eye. If you're serious about image quality then you are going to need a more accurate way of measuring your display.

ColorVision's Spyder2express is an inexpensive hardware calibration package. It consists of a USB calibration device and calibration software. Hang it over your screen, and it measures your monitor's image and tells you which settings to tweak. It's easy for beginners to use, and costs £53 inc VAT from www.pcw.com.





▲ Use the Black Point test to set your monitor's brightness

from the palette that pops up. Now click on the bucket icon to select fill and click on your image to make it black.

Bring up your monitor's onscreen display (OSD) and note where it appears on the image you created. Click the rectangular selection tool in the top-left of the toolbar and draw a small square on your image, away from where the OSD appears. Select Curves from the Colours menu. In the bottom-left of the colours menu at the end of the line is a small, round selection icon. Click the icon and drag it up to the x=0, y=5 position. Then click OK. You may notice that the square appears lighter than the rest of the image, but don't worry if you can't see any difference, as this will change when we get round to the calibration. Click elsewhere on the image with the selection tool to deselect the box.

Bring up your monitor's OSD and reset to the factory default settings. Then set the monitor's colour temperature. This is a measure of hue. Cooler colour temperatures appear more blue and warmer colour temperatures more yellow. Colour temperature is measured in degrees Kelvin. The higher the figure in Kelvin, the cooler the colour temperature. In photography and desktop publishing, the standard colour temperature of 6,500K is often used, as it's approximately the same hue as daylight.

If the option is available, set your monitor's colour temperature to 6,500K. This colour temperature may also be called Natural, or be on a numerical scale. If this is the case, set it to halfway along the scale. Then set the monitor's contrast to maximum and gradually reduce the brightness until the box in the image you created is just visible from the background. Your brightness should now be correctly set. Save the test image to your hard disk for future reference.

WHITE POINT TEST

The White Point test is a way of setting your monitor's contrast. In GIMP, create a new image, again with the same native resolution of your monitor. Set the foreground colour to light grey (see the screenshot above for an example) and colour the canvas grey using the fill tool. Using the rectangular select tool create a large box, but again steer clear of your monitor's OSD. Colour the box white with the fill tool. Create a smaller box within the box using the select tool, and with it selected choose Curves from the Colour menu. Click on the icon at the top-right end

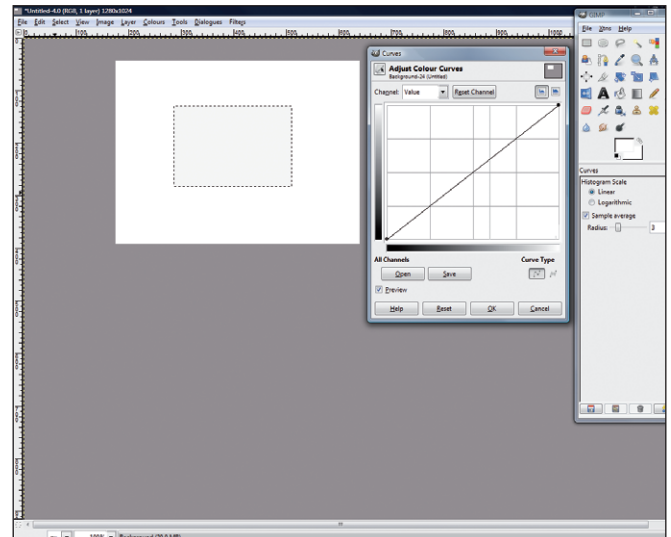
of the line and drag it from x=255, y=255 to x=255, y=250. Click OK and maximise the image to fill your screen. Ignoring the grey, focus on the white box. You should see a difference between the outer white box and the inner box where you made the adjustment. If you can't, use your monitor's OSD to reduce the contrast until you see a difference.

If you've had to adjust your contrast, the Black Point test may now be wrong. Minimise the White Point test window and load the Black Point test. Check the black point square is still visible; if it's not, adjust your brightness. Then bring back the White Point test and check that you can still see the difference between the boxes. If you have to adjust the contrast again, you may have to go back to the Black Point test. Switch between the two until you're happy that you've got it right.

ADJUSTING GAMMA CORRECTION

To obtain the most accurate image quality possible, you also need to adjust your PC's gamma correction. Gamma describes the relationship between the brightness, or luminescence, of each colour supplied to the monitor from the graphics card, and how bright that colour is displayed. As the monitor displays each colour at a lower luminescence than the colour supplied, the operating system applies gamma correction to increase the luminescence of each colour. Unfortunately, Windows always applies a flat gamma correction of 2.2, which doesn't take into account the different gamma of different monitors. To get around this, we must tweak the PC's gamma correction settings.

Go to www.quickgamma.de/indexen.html and click the Download English Version link at the bottom, then run the program. Follow the installation wizard, then run it, starting with monitor 1. In the middle of the QuickGamma window are a black and a grey bar, labelled Black Level A (ignore Black Level B). Your monitor should be as close as possible to a gamma of 2.2, so the grey bar opposite 2.2 should be barely visible. Your current gamma correction level is shown in the upper right of the program under Gamma. Adjust the gamma correction using the up and down arrows until the Black Level A bar is only just visible opposite the 2.2 mark. Your gamma correction should now be set correctly, so you should make a note of the final gamma correction figure.



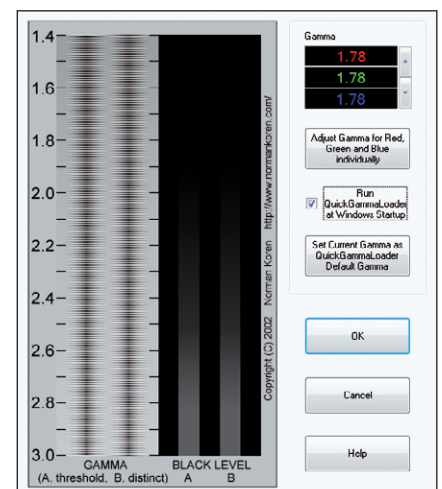
▲ The White Point test enables you to set your monitor's contrast

If you have more than one monitor, move the QuickGamma program to Monitor 2, adjust the gamma correction and make a note of the final figure.

To make sure your gamma is properly set each time you turn on your PC, you should create a colour profile. To do this, you can use the free QuickMonitorProfile program from <http://quickgamma.de/QuickMonitorProfile/indexen.html>. Download QuickMonitorProfile, install and run it. By default, it is set to configure Monitor 1, so use the arrows to enter the gamma correction you obtained for that screen in the Target gamma box. Click Create and then type a name for your colour profile (such as the name of the monitor) and click Save. The colour profile will automatically be associated with your monitor.

If you have got a second monitor, start QuickMonitorProfile again and select the second monitor from the drop-down box. Select the gamma correction for monitor 2, click Create, type a name for your profile and click Save. Your monitors are now colour-calibrated.

QuickMonitorProfile will save the profile and make it the default. To view your current colour profiles in Windows Vista, use the Colour Management application in the Control Panel. Monitor 2 is first in the list and monitor 1 is second. Windows XP users should open Color from the Control Panel. **CS**



▲ The QuickGamma program helps you to set your monitor's gamma correction level